that we have 523 such cases of agreement. The excess of 523 above 291 or 232 would appear, therefore, to be the number of cases in which the direction of the proper motion in quadrant has been determined by the effect of the parallactic displacement due to the motion of the Solar System in space. This number is, I should consider, quite sufficient to prove the reality of the assumed solar motion in space. If from 1167 we subtract the probable number of cases of unforced agreement, viz. 291, we have 876 cases remaining. If the effect of the parallactic displacement was as often greater as less than the absolute proper motion, we should have had 138 cases of forced agreement out of these 876 cases, or 729 favourable cases in all. We have, however, only 523 such favourable cases. The inference would appear to be that the effect of parallactic displacement is much oftener less than greater than the absolute proper motion. If the parallactic displacement is less than the absolute proper motion in the ratio of 3 to 4, we should have 219 forced cases out of 876. Our number of favourable cases would then be 510. This is about the number actually obtained. I consider, therefore, that without appealing to the mere agreement of different investigations in the position of the apex of solar motion we have from the results of the Greenwich investigations numerical evidence of the truth of the assumed solar motion in space. The effects of parallactic displacement arising from this motion appear, however, to be on the average much smaller than the independent proper motions of the stars.

Note on the Calculation of the Sun's Parallax from the Lunar Theory by P. A. Hansen. By E. J. Stone, Esq.

In the *Monthly Notices* of the Society, vol. xxiii. No. 8, and vol. xxiv. No. 1, will be found two papers by Professor Hansen, in which values of the Solar Parallax are deduced from the value of $\frac{a}{a_1}$ employed in the construction of his Lunar Tables. In the first paper the adopted value of $\frac{a}{a_1}$ is afterwards multiplied by 1·03573, the factor by which Professor Hansen found it necessary to multiply his computed value of the coefficient of parallactic inequality in order to make his theory agree with observation.

The value of $\frac{a}{a_1}$, thus corrected, is then multiplied by Hansen's constant of Lunar Parallax, $3419''\cdot57$. The value of the Solar Parallax thus deduced is $8''\cdot97$. The method pursued would appear equivalent to assuming that a is what is generally understood by the semi-axis major of the Lunar Orbit, that is, the semi-axis major, as deduced from the mean sidereal

time of revolution of the Moon. In the second paper the corrected value of $\frac{a}{a_1}$ is employed to determine the ratio of the Moon or the Earth to that of the Sun. With the ratio thus found, the length of the seconds pendulum, and the length of the sidereal year, the value of the solar parallax is deduced.

The equation employed for the determination of the ratio of mass of Earth to that of Sun is

$$\frac{a}{a_1} = \sqrt[3]{n^2 \frac{\mathrm{M} + m}{\mathrm{M} + m_1}}$$

where M, m, and m_1 are the mass of Earth, Moon, and Sun respectively. The ratio of $\frac{m}{\mathrm{M}}$ is assumed $= \frac{1}{80}$. In the text a is spoken of as the semi-axis major, and in the notes n is stated to be $\frac{\text{Earth's Mean Motion}}{\text{Moon's Mean Motion}}$. If, however, we should understand by this that the mean motions are referred to fixed axes, we should find $8''.97$ for the value of the Solar Parallax: the same value as that found in Professor Hansen's first paper. On reference, however, to Professor Hansen's theory it will be found, that if n denote what Hansen calls the mean motion and a the semi-axis major, n denotes the mean motion relatively to the apse, and a is obtained from n by a forced relation similar in form to that given by Kepler's third law,—

$$n^2 a^3 = k (\mathrm{M} + m).$$

This appears also from the numerical value of log n, assumed by Hansen, viz., 8·8775917. This being so understood, we obtain not $8''.97$ but $8''.916$. The value $8''.916$ can be obtained at once from the corrected value of $\frac{a}{a_1}$. At page 4 of Hansen's *Lunar Theory* we are given the adopted value of $\log \frac{\mathrm{D}}{a} =$ 8·2170139. Now $\log \frac{a}{a_1} = 7{\cdot}4187223$, hence $\log \frac{\mathrm{D}}{a_1} = 5{\cdot}6357362$ $= \log \sin \pi$, and therefore $\pi = 8''.916$.

The importance of Hansen's result is so great that I have thought it worth while to call attention to the slight want of precision in the notes appended to Hansen's second paper, more especially as we might be led by those notes to an erroneous result more likely to deceive from its agreement with the result given by Professor Hansen himself in his first paper. It may be mentioned that there is a printer's error on page (10) of Professor Hansen's second paper,

For 1·03973 *read* 1·03573.